

# A SURVEY OF THE WORK OF THE ROYAL BOTANIC GARDEN EDINBURGH IN 1978

## CONTENTS

	Page		Page
General Review . . . . .	503	The Garden, Edinburgh . . . . .	511
Taxonomic Research . . . . .	503	The Younger Botanic Garden . . . . .	514
The Herbarium . . . . .	507	Logan Botanic Garden . . . . .	514
The Library . . . . .	508	Horticultural Training . . . . .	515
Exhibition Hall, etc . . . . .	508	Annual Rainfall . . . . .	515
Publications . . . . .	509	Staff List . . . . .	515

## GENERAL REVIEW

This annual report presents the customary survey of activities of the Royal Botanic Garden and its satellites. Inevitably, for an organisation heavily involved in maintaining gardens of quality open to the public, a high proportion of effort is devoted to maintenance. Similarly a herbarium eats up "person" hours to keep it an efficient working tool for effective reference and research. These patterns continued in 1978.

Nevertheless, October 2 saw the gift by Lt. Col. A. N. Balfour and his family of the major part of Dawyck arboretum (c. 60 acres) to the nation for the Garden's use. In the near future Dawyck will be run with the Arboretum Department in Edinburgh and will be valuable for hardwoods, conifers suited to the climate, and specimen shrubs.

The completion of the film "Capital Garden" directed by Mr Ian Brock and first shown in early December marked another generous gesture to the Garden, for the Bank of Scotland sponsored the project. Already the film is in considerable demand not only in Britain but for showing in the U.S.A. and Australia also.

Several members of both garden and scientific staffs travelled overseas—often supported by other organisations and at their specific invitation—and all brought back rewarding collections of living or dried plants. This quickening in activity is reflected also in the considerable increase in scientific publications during the year.

The numbers of the public visiting the Edinburgh Garden fell during the year whereas the outstations at Benmore and Logan experienced rises. There is no information available to explain this but in Edinburgh many come for relaxation in fine weather and a poor summer limits this.

## TAXONOMIC RESEARCH

### SOUTH-WEST ASIA: FLORISTIC STUDIES

One of the most significant features of the year was the increase in our holdings of Arabian specimens. Mr Miller collected 700 numbers during a very profitable six weeks in the Yemen Arab Republic in September to October; a further c. 1400 specimens were either sent in exchange for names

or as a gift from Kuwait, Oman, Qatar, Saudi Arabia and Y.A.R. These collections, together with others received in recent years, form an important source of reference and research for present and future work.

The stream of specimens for naming from other parts of SW Asia, especially Turkey and Iran, continued. Several members of staff were also involved in preparing Flora accounts: Dr Cullen (*Marrubium* for *Flora of Turkey*); Mr Hedge (*Salvia* and *Quercus* for *Flora of Turkey*—the latter a joint account with Professor Yaltirik, Istanbul, who spent 4 weeks working here in September); Miss Lamond (several genera of Umbelliferae for *Flora Iranica* with Mr Hedge); Mr McKean (Elaeagnaceae and *Cytinus* for *Flora of Turkey*); Mr Miller (Loranthaceae and Santalaceae for the same Flora)—Mr Miller also continued work on a revision of *Vaupelia* (Boraginaceae).

Dr Davis's Flora of Turkey group (incl. Dr Edmondson and Mr Mill) continued to make full use of herbarium resources. Mr Musa Doğan (PhD student) and Dr Kit Tan were also regular users of the herbarium.

#### LÉVEILLÉ CATALOGUE (& RANUNCULACEAE)

Part XII of the *Catalogue* (Oleaceae to Solanaceae) was published in 1978, and work on part XIII is well in hand: Mr McKean has completed the Scrophulariaceae and has started work on the Labiatae, and Mr Lauener has started work on Gesneriaceae. Some accounts for part XIV are also complete: Mr Lauener has dealt with Chenopodiaceae and Amarantaceae, and Plantaginaceae and Polygonaceae were completed in collaboration with Dr D. K. Ferguson (Antwerp).

Work for the revision of *Aconitum* subgenus *Lycotconum* was completed during the visit of Dr M. Tamura (Osaka University) in August.

#### ERICALES, etc.

Work on the genus *Rhododendron* is now almost complete and publication of the results by early 1980 is expected. Taxonomic work on other genera has proceeded; the large collections of living plants accumulated at the garden (much of it collected by our own staff, notably Dr Argent, Dr Burbidge and Mr Kerby) is making an important contribution.

In May Drs Chamberlain and Cullen attended and spoke at an international meeting on *Rhododendron* classification held at the New York Botanical Garden under the sponsorship of the American Rhododendron Society. After the meeting, Dr Chamberlain visited the Arnold Arboretum, Cambridge, Mass., to study herbarium and living material. Dr Cullen spent some days working in the herbarium of the New York Garden, then visited the L. H. Bailey Hortorium, Cornell University, lectured at another *Rhododendron* meeting in Rochester, N.Y., and finally attended and lectured at the annual meeting of the American Association of Botanic Gardens and Arboreta held in McMaster University, Hamilton, Ontario, Canada.

In the spring Dr Argent returned to the Royal Geographical Society Expedition to Mulu (Sarawak), accompanied by Mr Coppins. A considerable amount of valuable living material was collected, as well as herbarium specimens. Dr Argent also participated in an international symposium on modern approaches to bryophyte systematics held at the University College of N Wales, Bangor, during August, and gave a paper entitled "Systematics of Tropical Bryophytes".

Dr Chamberlain supervised further botanical surveys of the Breadalbane area for the Nature Conservancy; several members of the Garden's staff (including Dr Page, Mr Coppins, Mr Grant, Miss Paul and Miss Richardson) took part.

#### ZINGIBERACEAE

Miss R. M. Smith continued her work on the family; two further papers were published. A start was made on the preparation of synoptic keys to the genera. Miss Smith is also assisting Mr B. Hyland with a survey of the Zingiberaceae of Queensland.

#### BHUTAN FLORA

During 1978 preliminary accounts of three major families (Leguminosae, Rosaceae and Scrophulariaceae, recording a total of over 560 species) were completed. A study of the Labiatae is currently being undertaken.

A visit of a fortnight's duration to Kew and to the British Museum (Nat. Hist.), London, by Mr Grierson and Mr Long was made in May to study the collections of Leguminosae at these institutions.

The first part of the research papers under the title of "Notes relating to the Flora of Bhutan" was published and a second was prepared during the course of the year. In connexion with the latter, a short visit was made to the herbaria of the above institutions by Mr Long in November.

#### CONIFERS & PTERIDOPHYTES

Work has continued on several aspects of conifer and fern taxonomy. The facilities for experimental cultivation provided by the new glasshouses (Block 6) have been extensively used. The study of seedling and juvenile morphology of conifers has continued, as have Scanning Electron Microscope studies of leaf surfaces. Collaborative work with the Institute of Terrestrial Ecology on the injection of trees with hormones to produce male and female cones has also continued.

The survey of conifers at Benmore and Logan, in collaboration with Mr Hall and Mr Colledge, has been completed and a programme for future planting has been established.

Papers on the taxonomy of *Agathis*, *Taiwania*, *Equisetum* and *Asplenium*, and on herbarium preservation techniques for conifers have been submitted to press.

Dr Page has continued to edit the *Fern Gazette* and has given an eight-lecture course on Pteridophytes to Honours Botany students at Edinburgh University.

#### CYTOLOGY (& BRAZILIAN FLORA STUDIES)

Much of Dr Ratter's research time was spent working on the collections made in Central Brazil during 1976 and in making a nine-week visit to Brazil (October-December) under the auspices of the Royal Society/CNPq scientific interchange scheme.

Miss Milne has continued cytological work on various Angiosperm families in conjunction with a number of members of the herbarium staff, and Mrs Brunton has continued her chromosome studies in Ericaceae (with Dr Argent).

## BRITISH &amp; EUROPEAN FLORA

Mr Harrold continued to identify British Plants sent in by the general public, and to work closely with the NCC on threatened Scottish plants. In July he and Mr R. McBeath visited various areas in Northern Spain. A large collection of both living and herbarium material was brought back; the identification of this has occupied most of the second half of the year.

## TAXONOMY OF CULTIVATED PLANTS

Miss Matthews has continued to collect and verify the identification of garden plants; herbarium material has been prepared as required. All plantings of *Pieris* in the Gardens have been systematically collected and named. Curation of the cultivated herbarium has continued.

Inquiries for identification from the public amounted to 440; plants for identification from the gardens brought the total to 530.

## BASIDIOMYCETES

Studies on agarics (Dr Watling) continue, especially on members of the family Bolbitiaceae and genus *Armillaria*. Mrs Gregory has expanded the cultural programme on *Armillaria* in order to study the development and anatomy of the fruiting stage.

The year has been spent in completing several projects, particularly a review of the asexual stages of larger fungi (with Prof. B. Kendrick, University of Waterloo, Ontario) and an account of larger fungi associated with willows; and in collaborative work with Prof. O. K. Miller, Virginia State University Polytechnic, USA, and Dr G. Kile, Cresswick, Victoria, Australia. Practical instruction in agaricology was given for four-week and two-week periods respectively to Dr Andriela Chandra of the Universities of Moscow and Calcutta, and Prof. G. Wade, University of Hobart. A compilation of all the records of larger fungi for the county of Yorkshire has been completed and an account of the life of the eighteenth century mycologist J. Bolton prepared.

Dr Watling spent six weeks in India during the late autumn where he conducted a course in agaricology in Srinagar, Kashmir, and lectured at the National Symposium on Larger Fungi at Sanat Nagar, and in Madras, Delhi, and Simla. He also lectured at two British Mycological Society Symposia in Britain, one on "Approaches to Fungal Taxonomy" and the second on "Succession in Fungal Populations".

In conjunction with Dr D. N. Pegler, Kew, an account of the larger poisonous fungi found in Britain has been prepared for the British Medical Association for ultimate distribution to general practitioners.

Studies have been conducted jointly with Miss Nicol (sandwich student) on a combined anatomical and developmental examination of the agaric *Lactarius rufus* for an HND biology project.

## ASCOMYCETES &amp; LICHENIZED FUNGI

Mr Coppins has continued taxonomic and phytogeographical studies on British lichenized and non-lichenized Ascomycetes. He has also continued his work on revisions of *Bacidia* and *Micarea*. Further critical notes and descriptions of new or interesting lichens have been prepared with Mr P. James, British Museum (Natural History). A new checklist of British lichens

and lichenicolous fungi has been prepared in collaboration with Mr P. James and Dr D. L. Hawksworth (Commonwealth Mycological Institute).

Mr Coppins spent two months collecting lichens and fungi in Sarawak as a member of the Royal Geographical Society Mulu Expedition. Now that Mrs Bennell has completed her analysis of the European species of *Phaeographis* she has commenced an initial examination of the Mulu material.

#### ELECTRON MICROSCOPE STUDIES

Mr Bennell has extended his studies on spore ontogeny in the Uredinales to a number of tropical genera, including *Uromycladium* and *Mikronegeria*. With the assistance of Mr Grant a comprehensive Scanning Electron Microscope survey of teliospore morphology of *Puccinia* species parasitising Saxifragaceae was undertaken. This is being correlated with developmental Transmission Electron Microscope studies. In co-operation with Mr Henderson a documentation of changes in the British rust flora has commenced.

Mr Bennell gave papers based on his studies at the British Mycological Society "Wall and Hyphal Growth" Symposium in April and at its "Approaches to Fungal Taxonomy" meeting in November.

#### THE HERBARIUM

##### ACCESSIONS, LOANS AND SPECIMENS MOUNTED

Exchange accessions in 1978 came from 16 institutes; the largest collections were from Tehran (Ariamehr), British Museum (Natural History), Geneva, Erevan, Hamburg, Lae and Pietermaritzburg.

Gifts and specimens collected by staff members totalled about 5000 specimens; c. 1120 were bryophytes of Britain and Canary Islands (Mr Long); c. 800 phanerogams from South Africa (Dr Hilliard & Mr Burt); c. 700 from Yemen Arab Republic (Mr Miller). Among specimens purchased were c. 450 from Lesvos (Mr J. Edmondson).

There were 136 "loans-in" from 49 institutes, involving over 12000 specimens; most of these were accounted for by work on the *Flora of Turkey* and studies carried out by Prof. Luiza Gouvêa on New World Ericaceae. Outward loans totalled 161, consisting of almost 7000 specimens to 71 institutes.

The drop in the total of specimens mounted in comparison with previous years largely results from Mrs Miller now only working part-time.

	1977	1978
Accessions	12,636	10,199
Distribution	3,828	4,499
Loans: in	2,900	12,451
Loans: out	6,485	6,813
Specimens mounted	19,555	15,739

##### HERBARIUM CURATION

The initial re-organisation of the Gramineae was completed but much detailed curation has still to be done.

##### PHOTOGRAPHIC SLIDE COLLECTION

About 800 slides were added to the collection. Amongst there were some 200 of plants and vegetation taken by Dr Davis in N Africa and Europe.

## VISITORS

Mrs. A. Ala (Tehran); Mr J. B. Allen (at Edinburgh); Dr T. H. Arnold (Pretoria/Kew); Mr M. Assadi (Tehran); Mr E. Banda (Malawi); Dr L. Bernardi (Geneva); Dr N. Brittan (Perth, Australia); Prof. K. Browicz (Kornik, Poland); Dr R. K. Brummitt (Kew); Mr P. Chai (Sarawak); Dr A. Chandra (at Moscow); Rev. N. Cruttwell (Papua, New Guinea); Dr A. Danin (Jerusalem); Miss E. Georgiadou (Athens); Mrs. S. Ghazanfar (at Cambridge); Prof. L. Gouvêa (Campinas, Brazil); Dr C. G. Gunn (Beltsville, U.S.A.); Dr H. H. Hajrah (Jeddah); Prof. H. Hara (Tokyo); Dr S. M. H. Jafri (at Tripoli); Mr T. Karlén (Lund); Dr K. Y. Kiew (Penang); Dr G. Kile (Victoria, Australia); Mr P. Kores (Papua, New Guinea); Dr M. Kovanda (Prague); Dr G. Ladizinsky (Jerusalem); Prof. T. B. Lee (Seoul); Dr J. M. Lock (at Lancaster); Dr J. L. Luteyn (New York); Dr J. McNeill (Ottawa); Dr J. K. Maheshwari (Lucknow); Mr B. Maslin (Perth/Kew); Prof. O. K. Miller (Virginia, U.S.A.); Prof. Mostafa (Cairo); Mr R. Press (British Museum); Dr J. S. Pringle (Ontario); Dr R. Reeves (Massey University, New Zealand); Dr T. Sato (Toyama, Japan); Prof. R. M. Schuster (Massachusetts, U.S.A.); Prof. J. Semir (Campinas, Brazil); Dr E. Sezik (Ankara); Dr F. Sorger (Vienna); Dr M. Tamura (Osaka, Japan); Mr P. Taschereau (at Manchester); Dr F. Tibbals (Durham); Mrs C. Torres de Assumpção (São Paulo, Brazil); Dr P. Uotila (Helsinki); Dr O. Vitikainen (Helsinki); Prof. G. Wade (Hobart); Prof. F. Yaltirik (Istanbul).

## THE LIBRARY

The increased pressure on library services mentioned in last year's report has continued, and the problem has been exacerbated by the frequent staff changes which have taken place during the current year.

In spite of these problems most of the service was continued at levels similar to or even above those of last year: interlibrary loans increased by 7% to 1401 (394 borrowed, 1007 lent), and the number of visitors using the library showed a small increase (528 as against 500 last year). Accessions, binding and photocopying continued at more or less the same level.

The available space for expansion in the library is now very small. This problem is under consideration by the senior staff of the Garden. The maintenance of the library service at its present level is in doubt unless the small and constantly changing staff can be enlarged and stabilised.

## EXHIBITION HALL, etc.

Two large exhibits were prepared during the year. The first, on Malesian Rhododendrons, was displayed at the Royal Horticultural Society Rhododendron show in London, and at the Scottish Rock Garden Club spring meeting in Glasgow. Later it was placed in the Exhibition Hall. The second, "Plants in Edinburgh's Climate", was displayed in the Exhibition Hall, to coincide with the Horticultural Education Association conference "The Winter Factor in British Horticulture".

Three exhibits prepared by outside bodies were also housed in the Exhibition Hall: Linnaean Bicentenary (Swedish Cultural Office), Dutch Elm Disease (Lothian Regional Council) and the Holyrood Park Project prepared by members of a job creation scheme based at Napier College.

Two Interlink programmes were held—"Tropical Rain Forest" in collaboration with Edinburgh Zoo, repeated because of the heavy demand from schools, and "Down Under" in collaboration with the Zoo and the Royal Scottish Museum. Other work included preparations for the Open Days, held in June, and the design and erection of a unified scheme of signposting for Logan.

## PUBLICATIONS

Three parts of *Notes R.B.G. Edinb.* were published during 1978:—vol. 36, 1:1–210; vol. 36, 2:211–464 (+ general index to vol. 36:465–480); and vol. 37, 1:1–236. These contained a total of 42 papers and 7 book reviews. Vol. 37, 1, edited by Mr Hedge, was a Festschrift for Mr Burt on the occasion of his 65th birthday and was made up entirely of invited papers.

A new guide book to Logan Botanic Garden, written by Dr Burbidge, was also published; it breaks with the traditional format of our previous guide-books and is illustrated with colour photographs. Material for a publicity poster for the Logan Garden was also sent to press during the year.

## PUBLICATIONS BY MEMBERS OF STAFF IN 1978

- BENNEL, A. P. & HENDERSON, D. M. Urediniospore and teliospore development in *Tranzschelia* (Uredinales). *Trans. Brit. Mycol. Soc.* 71:271–278.
- , HENDERSON, D. M. & PRENTICE, H. T. The teliospore of *Puccinia smyrnii* (Uredinales). *Grana* 17:17–27.
- & GRANT, K. N. Syringe-filter assemblies for handling lead citrate and other EM stains. *Proc. Roy. Micr. Soc.* 13:329.
- , CHRISTOPHER, P. & WATLING, R. Technique for routine anatomical studies of dried and fresh basidiomes, using plastic embedding and dichromatic staining. *Trans. Brit. Mycol. Soc.* 71:512–515.
- BRUNTON, D., GIBBS, P. E. & MARSHALL, D. Studies on the cytology of *Oxalis tuberosa* and *Tropaeolum tuberosum*. *Notes R.B.G. Edinb.* 37:215–220.
- COPPINS, B. J. H.M.Livens' Lichen collection at Bolton Museum: notes on some interesting specimens. *Naturalist* 103:105–107.
- A glimpse of the past and present lichen flora of Edinburgh. *Trans. Bot. Soc. Edinb.* 42 (Suppl.):19–35.
- , EARLAND-BENNETT, P. M. & GILBERT, O. L. Lichens of the sugar limestone refugium in Upper Teesdale. *New Phytol.* 80:403–408.
- , & JAMES, P. W. New or interesting British Lichens II. *Lichenologist* 10:179–207.
- , SEAWARD, M. R. D. & HITCH, C. J. B. Irish Lichen Flora: new vice-county records. *Ir. Nat. Journ.* 19:268–269.
- CULLEN, J. Programs and policies with respect to the maintenance of record systems. *Bull. Amer. Assoc. Bot. Gard. & Arboreta* 12:123–129.
- A preliminary survey of ptyxis (vernation) in the Angiosperms. *Notes R.B.G. Edinb.* 37:161–214.
- Asiatic gentians of series Ornatae. *Journ. Scottish Rock Garden Club* 1978:85–97.
- & CHAMBERLAIN, D. F. A preliminary synopsis of the genus *Rhododendron*. *Notes R.B.G. Edinb.* 36:105–126.
- GRIERSON, A. J. C. & LONG, D. G. Notes relating to the flora of Bhutan: I. *Notes R.B.G. Edinb.* 36:139–150.
- HARROLD, P. A glabrous variety of *Sagina subulata* (Sw.) Presl in Britain. *Trans. Bot. Soc. Edinb.* 43:1–5.
- HEDGE, I. C. Parentucellia in DAVIS, P. H. (compiler) Materials for a Flora of Turkey XXXV. *Notes R.B.G. Edinb.* 36:10–11.
- Accounts of several small hemiparasitic genera of Scrophulariaceae in DAVIS, P. H. (ed.) *Flora of Turkey* 6.



- & WENDELBO, P. Patterns of distribution of endemism in Iran. *Notes R.B.G. Edinb.* 36:441-464.
- & LAMOND, J. M. Further Notes on Umbelliferae-Echinophoreae. *Ibid.* 37:61-66.
- HENDERSON, D. M. & WATLING, R. Chapter 15: Fungi, in JERMY, A. C. & CRABBE, J. A. (eds.) *The Island of Mull: A Survey of its Flora and Environment*.
- LAMOND, J. M. Accounts of Androsace, Dionysia and Primula in DAVIS, P. H. (ed.) *Flora of Turkey* 6.
- & VALENTINE, D. H. The taxonomy and nomenclature of *Primula amoena*. *Notes R.B.G. Edinb.* 36:39-42.
- LAUENER, L. A. The typification of Royle's Rununculaceae. *Notes R.B.G. Edinb.* 36:127-137.
- Catalogue of the names published by Hector L  veill  : XII. *Ibid.* 37: 113-124.
- & TAMURA, M. A synopsis of *Aconitum* subgenus *Paraconitum*: I. *Ibid.* 37:113-124.
- LONG, D. G. On the distinction between *Scapania aequiloba* and *S. aspera*. *Bull. Brit. Bryol. Soc.* 31:26-29.
- *Hypnum hochstetteri* Schimp., a neglected name for *Myurium hebridarum* Schimp. *Journ. Bryol.* 10:65-67.
- Distribution maps of Bryophytes in Britain and Ireland. *Ibid.* 10:76-80.
- The moss *Hyophila stanfordensis* (Steere) Smith & Whitehouse in Scotland. *Trans. Bot. Soc. Edinb.* 43:25-26.
- MILLER, A. G. A reassessment of the genus *Pseudocamelina*. *Notes R.B.G. Edinb.* 36:23-34.
- PAGE, C. N. Ferns as taxonomic tools and the future of pteridology. *Trans. Bot. Soc. Edinb.* 42 (Suppl.): 37-41.
- RATTER, J. A., ASKEW, G. P., MONTGOMERY, R. F. & GIFFORD, D. R. Observations on forests of some mesotrophic soils in Central Brazil. *Revta. Brasil. Bot.* 1:47-58.
- Observations on the vegetation of north eastern Mato Grosso II. Forests and soils of the Rio Sui  -Missu area. *Proc. Roy. Soc. Lond. B*, 203: 191-208.
- SMITH, R. M. *Alpinia* sect. *Pycnanthus* and its New Guinea species. *Notes R.B.G. Edinb.* 36:273-292.
- & LARSEN, K. A new species of *Curcuma* from Thailand. *Ibid.* 36:269-272.
- WATLING, R. A strange alliance. *McIlvainea* 3:12-15.
- From infancy to adolescence: advances in the study of higher fungi. *Trans. Bot. Soc. Edinb.* 42 (Supp.): 61-74.
- The distribution of larger fungi in Yorkshire. *Naturalist* 103:39-57.
- Larger fungi from Greenland. *Astarte* 10:61-71.
- Observations on the Bolbitiaceae: 18. On the status of two Greenland species of *Conocybe*. *Ibid.* 10:72-75.
- , & GUZM  N, G. Studies in Australian Agarics and Boleti: I some species of *Psilocybe*. *Notes R.B.G. Edinb.* 36:199-210.
- , LARGENT, D. & JOHNSON, D. *How to identify mushrooms: III microscopic features*. Eureka.
- , PODGER, F. D., KILE, G. A. & FRYER, J. Spread and effects of *Armillaria luteobubalina* sp. nov. in an Australian *Eucalyptus regnans* plantation. *Trans. Brit. Mycol. Soc.* 71:77-87.



## THE GARDEN, EDINBURGH

A notable event of the year was the visit of the Horticultural Education Association, whose annual conference was held in Edinburgh. The meeting was organised by Mr J. M. Marshall and had the theme "The Winter Factor in British Horticulture". Participants visited the Garden and heard a lecture entitled "An account of how plants from many geographical regions of the world have responded to a northern temperate climate", given by the Curator, Mr R. L. Shaw.

## ARBORETUM DEPARTMENT (Mr S. J. Armstrong)

Renovation of the Copse continued and the space provided by the removal of old, less valuable Rhododendrons was filled with *Rhododendron* material of known wild origin. The gap formed by the loss of the valuable specimen of *Pinus nigra* at the Pond was filled with groups of *Taxus baccata* "Fastigiata" and *Cotoneaster salicifolius* "Herbstfeuer". The *Ulmus* collection was again injected with "Lignasan" as a possible protection against Dutch Elm Disease. A collection of viburnums were introduced into three new beds, to the west of the Pyrus lawn and in the South Border.

The following specimens were lost through gale damage during the year:—*Eucalyptus simmondsii*, *E. pauciflora*, *E. nicholii*, *E. aggregata*, *Crataegus pargens*, *Rhus typhina*, *Malus x soulardii* and *Caragana aborescens* "Pendula"; and the following plants were killed by frost during the winter of 77-78: *Coronilla emerus*, *Genista dasycarpa*, *Calycotome spinosa*, *Forestiera neomexicana*, *Sophora flavescens*, *Idesia polycarpa*.

The extension to the water supply principally to the south and west sides of the Arboretum, was carried out with the minimum disturbance, but repair work to garden paths remains incomplete.

The conversion of the West Lodge into park constables' accommodation and the up-grading of the public lavatories in this area necessitated the removal of some small trees and shrubs. A Garden Supervisor is responsible for the liaison with the contractors during this alteration.

A snowplough and electrically powered hedge-clippers were purchased during the year.

## GLASS DEPARTMENT (Mr J. A. R. Kerby)

1978 was notable for the official opening of the new planthouses (Block 7) by Sir George Taylor, Director of the Stanley Smith Horticultural Trust, and former Director of The Royal Botanic Gardens, Kew. The house has two independent landscaped sections. The first presents tropical plants, amongst which Gesneriaceae and Zingiberaceae predominate, in a setting of rock outcrops and informal borders, and the other offers a display of a wide geographical and taxonomic range of ericaceous shrubs on terraced peat walls. Since the inauguration the public have enjoyed many interesting and attractive features of a vegetation hardly seen before in Britain.

Elsewhere in the department many plants flowered well and of particular interest was the following: the endangered Himalayan *Talauma hodgsonii* (Magnoliaceae) flowered for the first time in R.B.G. The plant was received from Messrs R. Gill and Son, Himalayan Nurseries, Penryn, Cornwall, in

1939. It was planted out in the old Temperate House but had to be lifted and boxed when this house was demolished. Within eleven years of its successful transfer to the existing range of planthouses it flowered.

*Bulnesia aborea* (Zygophyllaceae) from South America flowered again in 1978 but as before only produced a single blossom, while that unusual member of Saxifragaceae *Brexia madagascariensis* flowered well and produced fruit. Most spectacular of all was the blossom of the Brazilian *Aristolochia gigantea*.

Cultural adjustment included the re-siting of an artificial tree away from the direct heat of hot water radiators in the Fernery so that epiphytic ferns and a number of orchids, viz. *Restrepia*, *Masdevallia* and *Pleurothallis* species (previously in the Tropical Orchid House), were able to respond favourably in cooler conditions. Likewise that spiny South African member of Apocynaceae *Carissa edulis*, and the Madagascan *Perrierastrum oreophilum* (Labiatae) were successfully re-sited.

In the borders outside the planthouses the severity of the 1977-8 winter proved too much for an eleven-year old, 20 ft high *Acacia dealbata* but *Bursera spinosa* (Pittosporaceae), *Melaleuca squamea*, *M. squarrosa* and *Leptospermum glaucens* (Myrtaceae) wintered unscathed.

The department is running a pilot scheme to assess the value of Rochford's hydroculture and to see if a wider range of plants can be grown successfully and economically using this system.

For the first time since the main range of houses was commissioned D.O.E. has agreed to an external glass cleaning programme. It is hoped that maintenance of this kind may recover the light transmission of the houses and eliminate the problems of drip caused by "glass lift" where moss and slime are prevalent.

The arrangements within the foyer were redesigned to good effect but remedial work to the roof (and floor of the planthouse above) to stop leaks, remains to be done in 1979.

#### HERBACEOUS & ALPINE DEPARTMENT (Mr. A. Evans)

Inclement weather during January and February restricted the amount of outside work carried out but despite this, and apart from the Tennis Court Project, other major tasks were completed. During the year Mr R. McBeath (Garden Supervisor) accompanied Mr P. Harrold (SO) on a successful plant collecting expedition to N Spain.

*Rock Garden.* The reconstruction of mound 44 on the west side of the east valley was completed. The entire area was resoiled and planted with species and varieties native to the Japanese Islands.

A number of dwarf conifers were planted in a new bed on the south side of the Rock Garden.

No large reconstruction was attempted in autumn. A large number of depauperate shrubs and duplicate conifers were removed. The vacated areas had the soil reconstituted in preparation for replanting in spring. A general assessment of many old plantings was carried out and where the numbers were found to be excessive these were reduced and so provided space for less well represented species.

*Alpine House Area.* Replanting of 90% of the troughs in the Alpine House area was carried out in spring to give a planting or collection theme in every one.

Many new, or at least wild collected specimens have been added to the alpine collection. The wild material from Japan, Spain and Central Europe has been considerably upgraded.

*Tennis Court Area.* This large project is still bedevilled by the slow action of contractors, and frustration mounts at not being able to progress fast enough because of their presence and activities. Nevertheless a great deal has been accomplished on this development and most of the credit is due to the hard work and tolerance of the staff.

*Plant Records.* The "colour coding" of the record cards has made progress and the pink cards denoting threatened plants and those of known wild origin have now been completed and are ready to be added to the computer print-out.

The number of plant identifications and verifications amounted to 438.

#### PROPAGATION DEPARTMENT (Mr L. E. Bisset)

That the propagation glasshouses, completed two years ago, are proving a worthy investment is evidenced in the improvement in plant collections during the past year; many plants flowered for the first time at Edinburgh, including two species for which there are no previous records of flowering in cultivation. The number and severity of mechanical and electrical faults, too, was much reduced during the year although the number of unexplained failures is still too high.

There were improvements and successes worthy of note in the Propagation Unit. The rooting of cuttings of *Tonacetum haradjianii* (the true Davis plant) and *Ilex fargesii* was extraordinary but the most spectacular event was the flowering of *Argyroxiphium kauense*, an environmentally demanding composite from Hawaii. This event can be credited to the skills of Mr Gardiner, who has written an account for *The Garden* (The Royal Horticultural Society Journal), and the seed section. Equally remarkable, and unique so far as we can tell, was success in rooting several side-shoots from one of the young *Argyroxiphium* plants originally grown from seed. Again, without the new propagation glasshouses, it is doubtful if the successful flowering could have been expected. It is hoped to grow and flower the equally demanding, arborescent *Lobelia* spp. from E Africa.

The Tropical and Temperate Propagation section improved enormously. South-east Asian Gesneriads, including *Loxocarpus* and *Boeica*, and several endangered species from Mauritius including *Cylindrocline commersonii* (which flowered for the first time in cultivation) and *Tetrataxis salicifolia* (which was thought to have become extinct 100 years ago) were amongst some of the interesting plants seen. A collection of *Diascia*, *Sutera*, *Diclis* and *Zaluzianskya* spp. all from South Africa and collected by Dr Hilliard and Mr Burt engendered a great deal of interest.

*Accessions.* The total number of items was 2,586 and of these 1,736 were of wild origin. The main contributors were Mr Burt and Dr Hilliard (many S African plants), Mr Harrold and Mr McBeath (191 plants and 54 packets of seed from Northern Spain), M. Masi (seeds and plants from Japan) and L. M. Mason (cuttings and plants from the tropics). The breakdown of accessions is as follows:—

Wild origin: 664 plants, 1033 packets of seed, 39 cuttings.

Non-wild origin: 382 plants, 447 packets of seed, 21 cuttings.

The total number of plants despatched during the year was 2,655, consisting of 357 seed lots, 972 plants, 1,169 cuttings, 50 bulbs, 72 scions and 35 miscellaneous items.

YOUNGER BOTANIC GARDEN, BENMORE, ARGYLL  
(Mr A. Hall)

Good progress is being made in the development of Benmore Hill Wood. The Job Creation Programme ended in March and a second scheme with the Special Temporary Employment Programme commenced in August and will continue until the end of January 1979. A J.C.B. machine was hired in March to bury the windblown stumps lying in the areas which had been cleared at that time. The new road was completed in March.

Plans for establishing a comprehensive collection of conifers have been under discussion in recent years. These were finalised and a policy document on the conifer project was circulated to the departments concerned.

In the spring planting, 250 specimens involving 43 genera and 139 species were planted out from the nurseries. Autumn planting did not take place this year because ground conditions were never suitable. There were only 11 days without rain in the four months from September to December.

The Pond was emptied and cleaned in sections by the garden staff to enable contractors to effect repairs to the concrete lining. The alternative entrance to the Golden Gates was opened and the gates were replaced and painted but the work has not yet been completed and landscaping and tidying of this area is being held up. Speed restrictions on the road from the Courtyard to the Golden Gates were enforced by laying ramps at intervals of 100 m.

We are indebted to the Marquess of Bute and his staff for the use of the stump gobbler. In spite of the atrocious weather conditions, eighty large tree stumps were removed from the lower areas of the garden, thereby improving the appearance and effecting a considerable saving in maintenance.

Attendance figures continued to rise: 42,486 for the period April to October, an increase of 5,000 on 1977.

LOGAN BOTANIC GARDEN, STRANRAER, WIGTOWNSHIRE  
(Mr J. M. Colledge)

As in past years, the greater part of the department's time was spent on routine maintenance duties. In 1978 a programme for renewing all grass surfaces in the Walled Garden was commenced. This task will occupy the department for several years, renewing one lawn or part of a lawn each year. In the autumn one lawn was ploughed up, levelled and resown.

Staff removed the shroud of ivy from Castle Balzieland revealing an attractive ruined tower. The remedial work required on the masonry has been referred to the Ancient Monuments Branch.

A sufficient number of *Cordyline australis* is being raised to replace the present overcrowded avenue by the main pond in five years' time. A further

150 *Pittosporum tenuifolium* were densely planted in the woodland. The practice begun in 1977 of killing off the weedy vegetation in the densely planted areas with herbicide, and feeding with fertiliser and mulching with compost has been a success.

In early 1978 PSA finally made the Deer Hill boundary fence vermin proof, after considerable damage had been done, especially to the hybrid larch, by rabbits and hares.

The majority of plants put in by the Scottish Woodland Owners' Association have survived despite damage done to leading shoots. However, *Pinus radiata* and Sitka Spruce were destroyed by adverse weather conditions shortly after planting. A good deal of beating up will be required in 1979. An addition was made on the fringes of the shelter belt by the planting of 120 *Salix* from Edinburgh.

The number of visitors increased by 2,000 to 42,000 in 1978 and the new guide book was well received by the public.

### HORTICULTURAL TRAINING SECTION

(Mr G. Anderson)

During July 1978 11 students gained Diplomas, (one with Honours) and 5 were awarded the Certificate in Horticulture. The awards and prizes were presented by Sir George Taylor. As in previous years, the majority of students gained posts with local authorities.

Following Mr Marshall's resignation during the summer staff changes occurred and certain lecture courses had to be reallocated. It was heartening to note that involvement of R.B.G. horticultural and scientific staff in teaching increased.

The marking scheme for the final examinations was reviewed and brought into line with the awards system used by other horticultural establishments and awarding bodies.

### ANNUAL RAINFALL

Edinburgh	650 mm (25.5 ins)
Benmore	2280 mm (89.5 ins)
Logan	868 mm (34.1 ins)

### STAFF LIST (December 1978)

<i>Regius Keeper</i>	Mr D. M. Henderson	
<i>Assistant Keeper</i>	Dr J. Cullen	
<i>Principal Scientific Officers</i>	Dr D. F. Chamberlain	Dr C. Page
	Mr A. J. C. Grierson	Dr J. A. Ratter
	Mr I. C. Hedge	Dr R. Watling
<i>Senior Scientific Officers</i>	Mr G. Anderson (Hort. Train.)	Mr L. A. Lauener
	Dr G. C. G. Argent	Miss R. M. Smith
	Dr R. B. Burbidge	Dr C. C. Wood
	Mr D. G. Long	

<i>Higher Scientific Officers</i>	Mr B. J. Coppins Mr R. Eudall Miss V. A. Matthews Mr A. G. Miller	Miss D. E. Purves Mrs J. M. Woods Mr P. J. B. Woods
<i>Junior Research Fellow</i>	Mr A. P. Bennell	
<i>Scientific Officers</i>	Mrs N. M. Gregory Mr P. Harrold Mr D. R. McKean	Miss C. Milne Miss M. A. H. Paul Mr D. A. H. Rae
<i>Assistant Scientific Officers</i>	Mrs D. Brunton Mrs F. M. Bennell Mrs L. A. Gibb Mr K. N. Grant Mrs H. Hoy Miss E. H. Hamlet	Mrs S. J. Jones Miss R. A. King Miss L. F. Mitchell Miss L. B. Richardson Miss D. M. Taylor
<i>Laboratory Attendants</i>	Miss M. Bryce Mrs E. A. McAllan Miss M. McLaren	Mrs G. Miller Mrs G. Young
<i>Curator</i>	Mr R. L. Shaw	
<i>Assistant Curators</i>	Mr S. J. Armstrong Mr L. Bisset Mr J. M. Colledge (LBG)	Mr A. Evans Mr A. Hall (YBG) Mr J. A. R. Kerby
<i>Garden Supervisors</i>	Mr G. Broadley Mr L. Buchan Mr R. U. Cranston Mr. J. M. Gardiner Mr G. Kirkpatrick Mr G. Knott	Mr G. J. Lewis Mr R. J. D. McBeath Mr W. Tait Mr B. Unwin (LBG) Mr M. Welsh (YBG)
<i>Librarian</i>	Mr M. V. Mathew	
<i>Assistant Librarians</i>	Mrs L. Clark	Miss E. M. Beber (Casual)
<i>Higher Executive Officer</i>	Mr J. Sinclair	
<i>Executive Officer</i>	Miss J. R. S. Renwick	
<i>Clerical Officers</i>	Mr K. Brodie	Mr J. B. Meff
<i>Clerical Assistants</i>	Mr J. S. Burnett Mrs A. J. Black	Miss H. Carse Mrs D. Mackay
<i>Senior Paperkeeper</i>	Mr D. Ward	
<i>Sergeant Park-keeper</i>	Mr J. Y. Thomson	
<i>Corporal Park-keeper</i>	Mr A. W. Brown	
<i>Park Constables</i>	Mr N. Campbell Mr W. B. Connacher Mr M. E. Fitz Mr P. N. Fletcher Mr D. C. Hogg	Mr T. Maxwell Mr T. A. Nisbet Mr G. Sinclair Mr R. Stevenson

<i>Gardeners Special</i>	Mr T. Y. A. Brown Mr W. R. Caldwell Mr A. Currie (LBG) Miss L. R. Cunningham Mr C. G. Drawbridge	Mr G. W. Lawson Mr J. McCluskey (YBG) Mr A. J. Paxton Mr J. Stewart Mr E. F. Young
<i>Gardeners I</i>	Mr S. Boyd (LBG) Mr T. R. Burnett Mr A. M. Cameron Mr W. Crowe (YBG) Mrs J. E. Currie (LBG) Mr G. Godbert (YBG) Mr J. Henderson	Mr W. Kocz Mr G. Murdoch (LBG) Miss B. C. Morrison Mr I. M. Potts (YBG) Mr R. M. Robertson Mr E. Smith Mr C. J. P. Taylor (YBG)
<i>Gardeners II</i>	Mr R. A. G. Davy Mr M. Fletcher (YBG) Miss S. E. Gregory Mr I. Herkes Mr J. McElroy Mr P. D. Mathys	Mr D. C. Shearer (YBG) Mr R. S. Sibbald Mr I. W. J. Sinclair Mr J. Smith Mr T. L. Sutherland Mr R. Waddell
<i>Assistant Gardeners</i>	Mr J. Fernie Mr I. A. Hutton	Miss L. F. M. MacArthur Mr J. Urquhart
<i>Junior Gardeners</i>	Mr G. A. Bain (YBG)	Mr K. Stables
<i>Driver</i>	Mr W. D. Lewis	
<i>Engraver</i>	Mr J. R. Wright	
<i>Labourers</i>	Mr J. B. Henderson Mr K. M. McFarlane	Mr R. S. Waddell
<i>Storeman</i>	Mr G. Roddex	
<i>Female Lavatory Attendants</i>	Mrs C. Horner	Mrs F. R. Horner
<i>Male Lavatory Attendants</i>	Mr B. Ford	Mr J. Martin
<i>Male Cleaner</i>	Mr G. Thomson	
<i>Nightwatchmen</i>	Mr J. Brady Mr J. Duffy	Mr J. McKenzie Mr W. Pringle